Mindfulness and Mind-Wandering in Older Adults

Implications for Behavioral Performance

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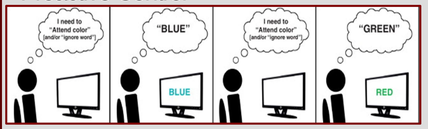
Background

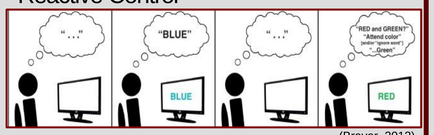
Cognitive Aging

- Age-related decline in cognitive control (Craik & Salthouse, 2008).
- Evidence for shift from proactive to reactive control (Bugg, 2014).

Proactive Control



Reactive Control



(Braver, 2012)

Mind-Wandering (MW)

- A shift of attention from a current task toward internal thoughts that are unrelated to the present moment (Smallwood & Schooler, 2006).
- Associated with poor performance on tasks that require sustained attention (McVay & Kane, 2009) .
- Interestingly, older adults report less MW despite cognitive decline (McVay et al., 2013)

Dispositional Mindfulness

- A purposeful, non-judgmental manner of paying attention and relating to the mind, body, and immediate experience (Kabat-Zinn, 2003).
- Sustained attention is a primary component of mindfulness

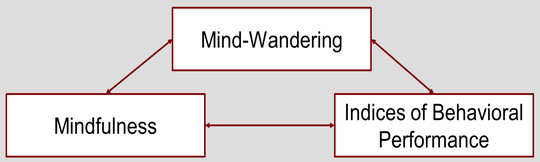
Mindfulness and Mind-Wandering in Younger Adults

Mrazek, 2012 found:

- Mindfulness was negatively associated with MW during a sustained attention task.
- 8 minutes of mindful breathing reduced MW during a sustained attention task, compared to relaxation and reading.

Aims

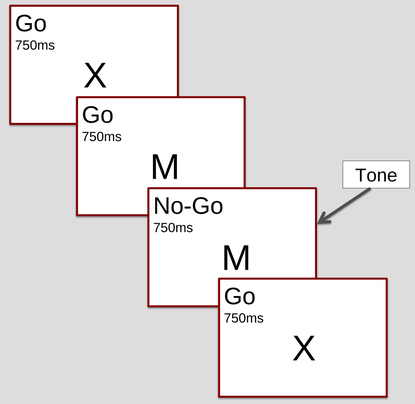
To examine the relationships between dispositional mindfulness, MW, and indices of cognitive control in an older adult population.



Task Design

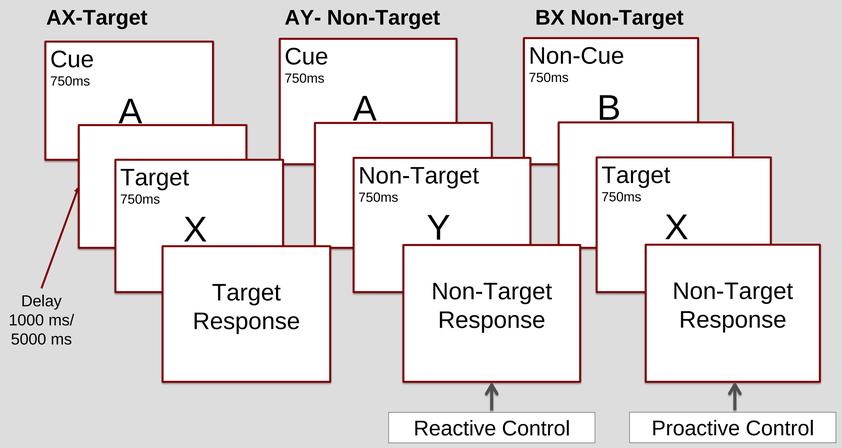
Go / No-Go Task

- Goal: Respond to target stimuli (Go), inhibit response when hear tone (No-Go)
- On average:
  - 63.3% Go Trials
  - 36.4% No-Go Trials



Continuous Performance Task (CPT)

- Goal: Respond "Yes" to target sequence, respond "No" to all other words
- 70% Target sequences (AX)
- 30% Non-target sequences (AY, BX, BY)



Procedures

Participants

- Our sample included older adults (N=74) between the ages of 60 and 74 with no experience with mindfulness and no neurological or psychological diagnoses.

Measures

Mindfulness Attention and Awareness Scale (MAAS)

- Measures awareness of and attention to the experiences of the present moment.
- Self-Report Questionnaire

Quasi-Random Mind-Wandering Probes

- Categorical distinction of current thoughts
- Embedded within cognitive task
- Self-Report

Categories	
MW	Non-MW
Performance Thoughts	On-Task Thoughts
Off-Task Thoughts	

Analyses

All variables were outlier corrected and checked for normality.

Performance Indices

Signal detection indices:

$$d_L = \ln \frac{H(1-FA)}{(1-H)FA}$$

- dL: H = Go trial accuracy, FA = 1- No-Go trial accuracy
- d-proactive: H = AX, FA = BX
- d-reactive: H = AX, FA=AY

Reaction Time Variables

- Reaction time to MW probes
- Coefficient of Variability of Reaction time (RT_CV)

$$RTCV = \frac{RT(SD))}{RT(Mean)}$$

Two-tailed Bivariate correlations

- Dispositional mindfulness (total MAAS scores)
- Proportion MW (categories 2 or 3)
- Task performance indices (dL, d-proactive, d-reactive, RTCV)

Results

Mindfulness and Mind-Wandering

- MAAS scores were negatively associated with proportion of MW on both the Go/No-Go task and CPT.
- MAAS scores were not associated with reaction time to MW probes on either the Go/No-Go task or CPT.

Mind-Wandering and Cognitive Control

- MW was not associated with accuracy scores on the Go/No-Go task.
- MW was not associated with proactive or reactive indices on the CPT.
- MW was positively associated with RT_CV on the Go/No-Go task, but not the CPT.

Mindfulness and Cognitive Control

- MAAS scores were not associated with accuracy on the Go/No-Go task.
- MAAS scores were positively associated with reactive, but not proactive, control on the CPT.
- MAAS scores were not associated with RT_CV on the Go/No-Go task or the CPT.

Go/No-Go

	MAAS	Proportion MW	RT to MW Probes	dL	RT CV
MAAS	1.00	-.309**	-.161	.191	-.176
Proportion MW		1.00	.502**	-.147	.238*
RT to MW Probes			1.00	-.245*	.320**
dL				1.00	-.510**
RT CV					1.00

CPT

	MAAS	Proportion MW	RT to MW Probes	Proactive dL	Reactive dL	RT CV
MAAS	1.00	-.286*	-.062	.049	.245*	-.197
Proportion MW		1.00	.625**	.058	-.092	.111
RT to MW Probes			1.00	-.105	-.066	.145
Proactive dL				1.00	.358**	-.367**
Reactive dL					1.00	-.338**
RT CV						1.00

Note. $*p \leq .05$, $**p \leq .01$

Discussion

- Extending upon previous literature, mindfulness was inversely associated with MW in a sample of older adults.
- In contrast with previous findings from young adult samples, MW was only associated with reaction time variability, but not accuracy in either task. This may be attributed to observed ceiling effects within the tasks.
- Mindfulness was related to reactive, but not proactive control. Within older adults, reactive control is more preserved than proactive control (Bugg, 2014), thus mindfulness may be more robustly related to reactive control. These results may provide some insight into how mindfulness is related to the proactive-reactive shift that occurs in the aging brain.
- Future studies should continue to examine the relationships between mindfulness and control strategies, using neuroimaging to elucidate the neural mechanisms of such processes in the aging brain.

**Work on this project was funded by The Undergraduate Summer Research Fellowship from the Department of Psychology and the 2014 and 2015 Social and Behavioral Research Grant.*